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Crowding Out Effect of Tobacco Usage on Household Education and Health Expenditures - An Econometric Analysis

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ABSTRACT

Tobacco consumption is growing day by day everywhere in the world in countless forms such as supari, tobacco raw, chew, pan, cigarettes, bidi and naswar etc. Tobacco consumption may avert the limited family resources far away from advantageous uses between low-slung income households. The relatively underprivileged households frequently allocate an ample share of the domestic budget on tobacco expenditures. These uneconomical expenditures on tobacco could be a diversion of household monetary resources from necessary things, such as foodstuff, healthcare and education. Explicitly this paper discovers the crowding-out impact of tobacco expenditures on a household's education and health payouts. The facts for this study has been engaged from HIES (Household Integrated Economic Survey) conducted regularly by PBS (Pakistan Bureau of Statistics) that offers evidence at household level and covered the whole nation. The estimation has been carried out by employing the Engel Curves, the quadratic terms using QUAIDS (Quadratic Almost Ideal Demand System) were found to be empirically important in describing household budget behavior. By employing data on outlays, study evaluated a user demand structure that comprises numerous main spending classifications (tobacco, education and healthcare). OLS (Ordinary Least Square) was used to estimate the effect of tobacco outlay and other covariates on share of education and health in the total budget of a household. The results found out were just alike John (2006) that a rise in the tobacco expenditure brings a reduction in the budget quota dedicated to health and education. The

Keywords

Tobacco,
Household,
Health,
Education,
Engel Curve,
QUAIDS

JEL Classification

D10, D15

quantitative results aim to help the policy makers to formulate and apply such policies to restrict the consumption of tobacco products and diverting those expenses for the formation of human capital by increased spending on health and education.

1. Introduction

Tobacco consumption is a lavish custom. The expenditures on tobacco amongst low-slung income clusters can avert limited domestic means away from advantageous consumptions. Poor families often allocate a substantial part of the family budget on tobacco. This will double if the indirect cost of health expenditures included. The healthcare costs of smoking include direct and indirect costs. Direct costs—payments include health care facilities, medicines, transportation facilities, and extra food costs (diet, food in hospital) while indirect costs i.e. productive time lost when sick, time of caregivers. The burden of healthcare costs of smoking will bear by the Government (national health insurance, care for the poor), Individuals (out of pocket) and Private sector (employers, insurance companies). Most of the household has a fixed budget, while outlay on tobacco and related goods could possibly turn away household cost-effective resources from necessary goods and services, like foodstuff, healthcare and education that stay certainly important for human progress. Hypothetically, the dimension and practice of crowding-out effect of consuming tobacco over foodstuff, healthcare and education may vary among households. The influence is expected to be minor on food related goods compared with education and healthcare assumed a fewer elastic nature of foodstuff consumption. Unlike its influence upon household outlay on foodstuff and education, although, the relationship among tobacco consumption and healthcare outlays is blurry. The opportunity cost of consuming tobacco and related goods are regularly assessed on state level considerations for health overheads and loss of efficiency due to diseases caused by tobacco, another substantial but less evident micro-level tool by which the consumption of tobacco and related good could possibly have adverse significances for the fiscal comfort of tobacco users and their direct family members. This adverse influence has been pronounced as the “crowding-out effect” of tobacco related goods usage on household consumption.

The consumption of tobacco and related goods is very common among individuals from low economic clusters living with a below average standard of living, low or no education at all in urban and rural areas respectively. Tobacco consumption is growing day by day everywhere in the world in countless forms such as supari, tobacco raw, chew, pan, cigarettes, bidi and naswar etc. According to a report WHO (2013), Pakistan ranks highest

among the South East Asian Region in consumption of tobacco and related goods. Another Global Report (2014) found Pakistan among few countries where smokeless (chew and raw tobacco) is extensively used. As per CTC (Coalition for Tobacco Control, Pakistan) there are more than 22 million smokers and 52% to 55% of the families have at least one tobacco user in any form. There are some clear indications that low standard of living (SOL) or low socioeconomic position (SEP) that is linked with higher probability of consume smoke and smokeless tobacco. Not merely individual status level indicators (for instance qualification, earnings, and occupation) correlated with tobacco consumption, but regional level indicators of interruption are exposed to be substantial interpreters of using tobacco, for instance the people residing in deprived zones are probable smokers.

The relationship between SEP/SOL and tobacco consumption has been glowingly recognized, but the deviations in SEP/SOL regarding household tobacco outlay has received inadequate response. It should be an apprehension if a household with lesser financial resources report more tobacco outlay or devote a greater fraction of his finance on tobacco and related goods.

There are numerous studies observed the facts that the association of tobacco outlay is directly correlated with healthcare disbursements; the spending on healthcare is higher among families with tobacco user, as a consequence of uninterrupted health-related overheads due to tobacco related diseases.

Conversely, the fiscal influence of consuming tobacco and related goods on healthcare outlay could also slog in reverse path as tobacco consumption might lessen one-use income for healthcare. Therefore, the route and degree of the consequential relationship between healthcare expenditures and tobacco consumption depends upon the relative degree of these two offsetting properties.

1.1 Tobacco Consumption – Pakistan Perspective

In Pakistan, tobacco consumption has materialized as a severe health consequence because of its standing among the first four countries of the world with a swift rise in tobacco market. A probable figure of about 40% of males and 9% of females are user of tobacco and related goods with an upsetting increasing growth rate. Nearly about 100,000 deaths per year endorsed by tobacco consumption in Pakistan. Most of these deaths are amongst men, the main earners of households. This damage could increase the probability of tumbling beneath the poverty line for the families who have lost their bread-winner. Hence, tobacco outlay deteriorates poverty in short-run and long-run respectively. In short-run, the outcome could be a possible inverse effect on disposable income while the chances of morbidity and

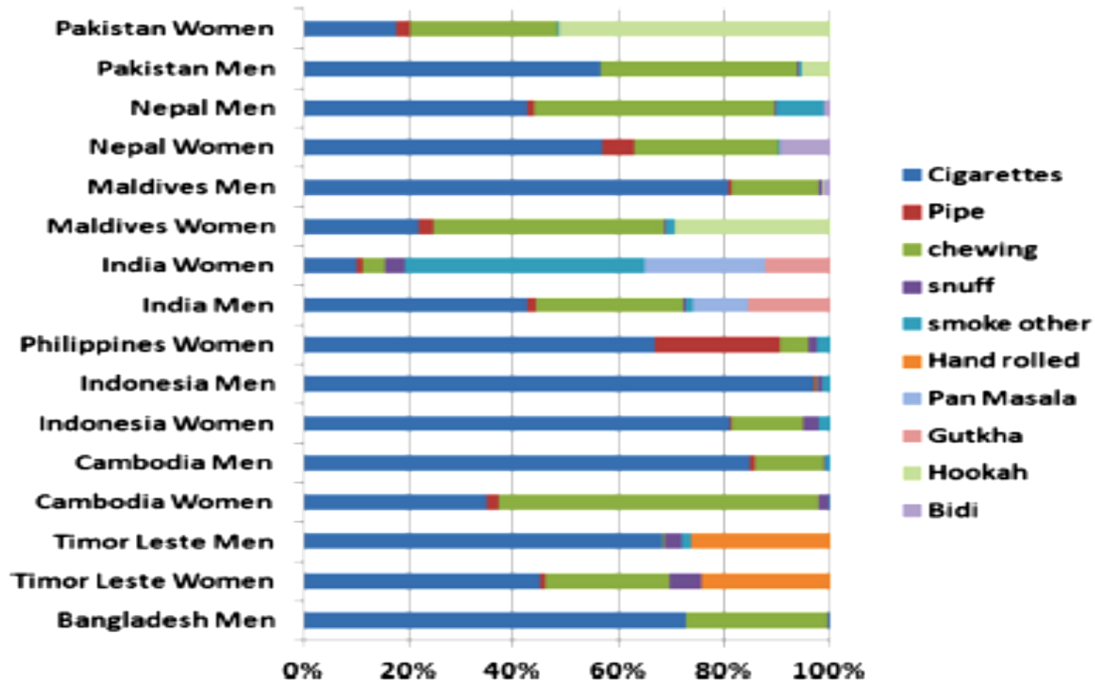
mortality increases the healthcare outlay for household with reduced level of savings. This fact should be realizing by the habituated Government of Pakistan that the public spending of Rs.100 Billion on diseases caused by tobacco and related goods, is greater than the revenue of Rs.75 billion generates from the tobacco industry per year. (Faiza Ilyas, Published in Dawn, May 27th, 2015)

According to a report on “The Economic Cost of Tobacco-Induced Diseases in Pakistan” by Nayyab et al (2021), Pakistan Institute of Development Economics (PIDE), the researchers find that the total costs of all smoking-attributable diseases and deaths in Pakistan in 2019 amount to 615.07 billion (US\$ 3.85 billion), with indirect costs making up around 70% of the total. The direct costs account for a significant portion of Pakistan's total health expenditures: 8.3%. The total costs of cancer, cardiovascular diseases, and respiratory diseases are Rs 437.76 billion (US\$ 2.74 billion), or 71% of the total smoking-induced costs.

1.2 Tobacco at Present

Tobacco and smoking mixtures are more synchronized today. The Companies engaged in tobacco production and sales have lost numerous litigations and are now enforced to visibly tag their merchandises as having an injurious influence on the healthiness of a person. Moreover, tobacco promotion is rigorously restricted and controlled. The estimates show that there are around 1 billion tobacco users globally today and tobacco companies earning billions of dollars’ income every year, abolishing the healthiness of others. The loss triggered by this habit and its peddler’s amounts in trillions of dollars of healthiness overheads and environmental injuries and additional struggle should be made to inform society, particularly teens and adults, about the hazards of tobacco consumption.

Figure 1: Proportional Distributions of Various Forms of Tobacco Consumed Among Men and Women in Nine South and South-East Asian Countries



Source: Sreeramareddy et al (2014)

1.3 Objectives

This study's prime objective is to discover the association among tobacco expenditures and its crowding out effect on Household Education and Health Expenditures in Pakistan. This study is therefore motivated to find out as how the expenditures on tobacco crowd-out other purchases. This study investigates how much income a households allocate on tobacco. This is estimated by explaining the deviations in budget segments, assigned for several things of interest, due to variations in spending allotted to tobacco. The ultimate focus of this study is mainly on tobacco spending by households and its crowding-out effect on health and education expenditures.

The explicit purposes of the study are:

- To investigate the tobacco usage pattern by province, region, occupational group, educational group and income group.
- To relate the health and education expenditures with tobacco overheads and explain it's crowding out effect on education and health by using the conditional demand function.

1.4 Contributions

Tobacco use in low income household has an inverse relationship with household outlay on health and education, proposing potentially adverse impact on investment in social capital improvement. The outlay on tobacco smoked, non-smoke or chewable particularly cigarette portrayed health related issues. By now, no investigation was performed in Pakistan to find out the crowding out impact of tobacco usage on health and education outlays of a household. The consumption of tobacco is not limited to the poor families as there are several households with a sound social and economic status consumed tobacco more than the underprivileged families.

1.5 Research Hypothesis

The following null hypotheses have been scrutinized in this study:

- Consumption of tobacco is independent of its price.
- Earning intensities of household cause no variance in tobacco intake.
- Education does not impact the consumption of tobacco.
- The region either rural or urban has no association with tobacco consumption.
- The decision of using tobacco has been influenced by several socio-economic and demographic variables.

2. Literature Review

The origin of study about consumer's budget allocation was started from Northern Europe in early 1840's but the most remarkable work in this arena was done by Stigler (1954) followed by Engel (1857). Engel acclaimed a rule that became the base of forthcoming exploration. As stated in the introduction thoroughly that the overheads interrelated with household tobacco intake are frequently hypothesized by the cost burden on economy, endorsed to tobacco via death, amplified healthcare outlay and mislaid efficiency in the household Volinia et.al (2006), Chaloupka et.al (2000), Menke et.al (2003), and individuals linked to the substitution of their possessions due to tobacco usage. The focus of our paper is mainly on the crowding out influence of tobacco consumption on household health and education outlay.

Efroymsen et.al (2001) highlighted the likely crowding out impact of tobacco outlay. He involved data on consumption of tobacco and integrated household expenditures from the BBS (Bangladesh Bureau of Statistics). The findings from the research shown that male tobacco users disbursed more than two times on tobacco as on apparel, accommodation, education and health combined.

Vermeulen (2003) targeted his research on Belgian household budget survey of 1987-1988 which embraces the expenditures of 3235 household made during the whole year. He used the Banks et.al (1997) Engel Curve Technique of (QUAIDS) Quadratic Almost Ideal Demand System. He incorporated household features, conditioning outlay on tobacco and probable heterogeneous preference of tobacco users and non-users.

Busch et.al (2004) empirically analyzed that how tobacco outlay crowd-out depletion of other commodities by approximating the configurations of changeover and reciprocity among tobacco products and other classes of household expenditures. The outcomes from demand system showed that price of cigarettes and demand for food is directly proportional while in few mockups negatively associated with demand for clothing and accommodation procured. Expressive figures specified that tobacco users devote less money on accommodation.

Busch et.al (2004) in USA, evaluate a consumer demand system that is inclusive of numerous main spending sets (cigarettes, nutrition, alcohol, accommodation, health, transportation, apparel) and regulation for socio-economic variables along with other bases of evident diversification. Expressive figures show that smokers spend less on accommodation as compared to non-smokers.

Wang et.al (2006) examined the influence of tobacco outlay on domestic spending patterns in rural China. The dominance of tobacco consumption is high among men and earnings are low in this country. The author evaluated the association among tobacco outlay and disbursements and found that the disbursements on tobacco can hurt other household members by decreasing overheads on elementary prerequisites like foodstuffs, durable commodities consumption and utilities. Therefore, tobacco can have significant influence on intra-family distributions.

John (2008) employing the data from India's National Sample Survey. He employed instrumental variable techniques to explain the probable endogenous nature of tobacco consumption in a structured demand system. The outcome by John was not different as anticipated that tobacco outlay crowded out foodstuff, entertainment, healthcare, apparel, fuels, and entertainment expenditures.

Pu et.al (2008) cast-off statistics from Survey of Family Income & Expenditure of Taiwan, 2004 to display the effects of crowding-out of tobacco inclusive of alcohol in a republic that had truncated spending could be quiet severe. He further found that tobacco crowded out apparel, health upkeep and conveyance among others by applying John's (2008) technique using spending data from Taiwan.

An auxiliary to the works was provided through using a diverse mechanism for tobacco spending by Koch and Tshiswaka-Kashalala (2008). The tool chosen was a combined smoking dominance measure established on predominance evaluations for South Africa, computed in Van Walbeek (2002). The outcomes revealed that tobacco crowded out disbursements on education, energy, healthcare, apparel, and conveyance aimed at the complete sample of smoking households.

Block and Webb (2009), requiring suitable influential variables, they employed a secondary method to recognize the underlying effect of tobacco spending on household's spending choices. The elementary idea underlying is that if a set of mutual covariates diminishes the share to nutrition and lessens teenager tallness however at the same time rises the share to tobacco, then this is an expression of crowding out.

John et.al (2011) using The National Sample Survey (NSS) comprises comprehensive household spending records in classifications like nutrition, apparel, education, and tobacco goods, estimate (SAF) i.e. smoking-attributable fraction. Then he multiply (SAF) by total health spending in households using tobacco to obtain tobacco-attributable health overheads. He found that tobacco and health expenditure (caused by tobacco) in tobacco consuming households rises the poverty in India. The well-being of the family can be further increase by not spending on tobacco and investing in to education instead.

Chelwa, G., & Van Walbeek (2014), their exploration displays that tobacco outlay inversely effects household spending on nutrition, education, water, and apparel. They employed spending statistics from Zambia (a sub-Saharan African country with low income and most of the households are underprivileged). They estimate Engel curves by means of the (QUAIDS) Quadratic Almost Ideal Demand System developed by Banks et.al (1997).

Yao et.al (2014) outcomes indicate that certain group of smokers in China admit that the amount spend on cigarettes could be better expended on household essentials. The influence of smoking on crowding out or depriving of other household expenditures in China is predominantly significant as China stands the prevalent user of tobacco in the world.

Nasir et.al (2015) concludes the relationship among socioeconomic dynamics with smoking and its comparative influence on the male gender of Pakistan. The data was taken from Pakistan demographic and health survey data set 2010-13. The socioeconomic factors that found statistically significant are wealth index, residence by province, education, age, access on media particularly radio and newspaper. The numerical conclusions will provide guidance in control and management of smoking.

San S. & Chaloupka F. J. (2016), in Turkey has been performed by using Turkish

Household Budget Surveys (2007 and 2011), projected the (QCEC) Quadratic Conditional Engel Curve to conclude domestic expenditure configurations. The study revealed a crowding out effect for both years studied, whereby expenditures on smoking effects in reduced household spending on nutrition, accommodation, durable/non-durable goods and education.

The methodology in this study is thoroughly brought into line with the utmost latest group of observed studies on the crowding out effect of tobacco consumption. The study's foremost role is to use the usual influential variables recycled in the literature while making less rigid assumptions about the behavior of these influential variables.

3. Methodology and Data

The paper estimates a system of consumer demand that integrates a series of considerable outlay classifications (health, education and tobacco) and regulators for demographics and socio-economic variables as well as further bases of evident diversity.

3.1 Data Source, Limitations and Sample Size

The data used for analysis purpose is taken from Pakistan Social Living Standards Measurements (PSLM) survey (2015-2016). There are certain limitations of the data such as:

- The tobacco outlay at distinct level is not provided, therefore, individuals' features cannot be incorporated in the analysis.
- Due to tobacco intake the specific illnesses cannot be estimated.
- The data does not furnish explicit advice regarding the prices of tobacco products

The statistics provides information on household characteristics and utilization of many foodstuff and non-food stuffs with tobacco products. This dataset relates to Household Integrated Economic Survey (HIES) which is conducted in 2015-16. This HIES data covers 24,238 households. It provides substantial data on consumption patterns, savings, liabilities, and household income at national and provincial level with urban/rural itemization.

3.2 Empirical Methodology

The main objective of this study is to calculate the budget share (net of tobacco expenditures) of a household for various socioeconomic classes supplemented with the demographic variables. To realize this concern, the paper needs a precise econometric model accompanied with an appropriate statistical technique. While conducting the study it has been observed that this can be achieved in a number of ways but every technique that could be chosen has both its pros and cons. Therefore, the choice of finest technique among many obtainable is of utmost importance to attain a firm and vital conclusion. The paper estimates

a system of consumer demand that integrates a series of considerable outlay classifications (health, education and tobacco) and regulators for demographics and socio-economic variables as well as further bases of evident diversity.

3.3 Econometric Modeling and Estimation Technique

Inspiring after the previous efforts, the study incorporates the approach of Bhalotra & Attfield (1998) and John RM (2008), hence, left with the lean alternatives after eliminating linear models. The analysis carries out using the stipulation of AIDS. As of yet, this approach is not frequently applied for investigation of the household data records, aside from Iqbal & Anwar (2014) and Haider & Zaidi (2017). With a view to use this method, subsequent variables are mandatory; income and shares of several household consumption goods in total household budget. The figures on income are not very much authentic in HIES, as masses are reluctant to disclose their true earnings, hence, to deal with this dilemma Houthakker (1970), suggested to employ total spending as an alternate of persistent income. The use of total spending as a substitute of persistent income may usually carry off the issue of economies of scale (savings). The total spending of households can be slice into these two i.e. income and substitution effect. The income effect pertains to a rise in household size at certain level of income which leads to a fall in per capita income of household and left them even poorer, while the substitution effect holds an expansion in bare necessities due to enlarged household size. To undertake this issue, the variable per capita expenditure is used, that is obtained by dividing total expenditures with household size. Since HIES data records does not gather data for prices of goods consumed. However, the spending data along with consumed quantities of the particular goods are obtainable from the HIES data records, that can be employed to locate a closest alternate of commodities price.

The study engages the Almost Ideal Demand System to observe the household demand and substitution patterns between tobacco items and other spending categories. Deaton and Muellbauer (1980) projected a subjective first-order approximation with (AIDS) to any demand system which could be persistent with the assumption of inadequacy (i.e. entities compelled to make an alternative decision) and gratify the theorem of individual choice. The study using facts estimate a consumer demand scheme that comprises of several core spending classifications (medical care, education and tobacco). The budget shares of various commodities (medical care, education and tobacco) disclose the real total expenditures using this scheme of consumer demand equations. Because the (PSLM) survey contains information about demographics, therefore the study can be capable to act as regulator for socio-economic variables and other causes of observable assortment. The study evaluates this scheme for entire households inclusive of low-income and tobacco users. To estimate

the hypothesis of crowding out due to tobacco outlay, Engel Curve Technique is employed as applied by Bazlul H Khondker; Mandeep K Virk-Baker; Muhammad Jami Husain (2016). The influence of covariates on tobacco outlay was estimated using OLS regression by M Siapush (2003).

In this study the estimation is carried out using QUAIDS to observe non-linear seemingly unrelated regression. QUAIDS is the propagation of LA-AIDS formulated by Deaton and Muellbauer (1980a, b). While the non-linear propagation of LA-AIDS was projected by Banks et.al (1997). The chief benefits from these models are the simple estimation of the micro-economic theory (neo-classical), while the macro-economic evaluation has a tendency to be discriminatory as they do not consider society's behaviors and heterogeneousness. QUAIDS additionally amplifies the AIDS of non-linear (quadratic) label of log expenditure and log income, therefore, it forms a non-linear "camel hump" shaped Engel curves. The elasticity that arises due to the Engel curve was needed to observe the quadratic relationships among different socio-economic variables as preceding model was restricted to linear relations while observing income-consumption association. The evaluation could be biased specifications due to lack of this prerequisite for preceding studies. Application of the household theory call for a particular model. The econometric studies of demand generally comprise of single equation and a system of equations respectively.

For a household or consumer buying "n" commodities, the function of demand can be comprehensively shown as:

$$q_i = q_i(p_1, p_2, \dots, p_j, \dots, p_n, I), I = 1, 2, \dots, n. \quad (\text{eq.3.1})$$

where; quantity demanded denoted by "q_i", "p" represents price, "i" the subscript represents the merchandises; and "I" is income.

There could be two restrictions necessary for utility maximization, although the budget along with utility function of an individual is understood. It can also be executed numerically, by way of Lagrangian, where the system of equations determined by first derivatives, and resolved by rendering the utility function to the constraint demonstrated by the budget:

$$\text{Max } U = (x_1, x_2) \quad ; \text{ s.t. } M = p_1x_1 + p_2x_2 \quad (\text{eq.3.2})$$

Consumers are characterized by eagerness and quantity boosts the growth of utility functions, while the only constraint to consumption is a fixed budget. The second part of the maximization problem is provided but the budget constraint. The only thing need to be adjusted is the utility that derive from the consumption within budget. Suppose and individual have to select two goods, 1 and 2, then the constraint will be written as follows:

$$M \geq p_1q_1 + p_2q_2 \quad (\text{eq.3.3})$$

Pursuing Pollak (1969), assumed a predetermined consumption of one good by a household's. In this study, suppose a household pre-allocated a certain amount on tobacco consumption. In practical terms, it implies that the household seeking utility maximization now has to maximize utility, subject to the spending in surplus of the pre-allocated tobacco expenditure.

If the n th commodity is tobacco, suppose that first $n - 1$ commodity is presented in the market on the prices $\{p_1, \dots, p_{n-1}\}$ above which the household has no power and the total spending on these commodities are denoted by M [$M = Y - p_t q_t$], where p_t is the price of tobacco and q_t the quantity consumed]. Now the utility maximization dilemma for the household will turn out to be:

$$U = (x_1, x_2 \dots x_n) \quad ; \text{ s.t. } \sum_{i=1}^{n-1} P_i x_i = M \quad (\text{eq.3.4})$$

and the supplementary restriction

$$x_n = \bar{x}_n \quad (\text{eq.3.5})$$

where household allotment of tobacco denoted by \bar{x}_n . The resolution for this maximization issue, resolving only for $n - 1$ commodities, provides conditional demand functions which can be transcribed as:

$$x_i = g^{i,n} (p_1, \dots, p_{n-1}, M, x_n; a) \quad (\text{eq.3.6})$$

The conditional demand function here is represented by $g^{i,n}$ for the i^{th} commodity, i.e. conditional on the use of n^{th} commodity (tobacco).

Therefore, by integrating household features (f), customized spending on tobacco (p_t), and probable diversified choices of tobacco consumers and tobacco non-users along with an explicit variable “ d ” with an objective of testing for consumer separability. The study estimated the subsequent Engel curves (conditional) for two extensive commodities of concern i.e. education and health.

$$\Omega_i = (\alpha_{1i} + \alpha_{2i}d + \alpha_{3i}p_t q_t + \delta_i^0 \sum f) + (\beta_{1i} + \beta_{2i}d) \ln M + (\gamma_{1i} + \gamma_{2i}d) (\ln M)^2 \quad (\text{eq.3.7})$$

The above equation 3.7 is structured in a form of budget share. For a set of consumers, the extension of demand functions for individual consumer requires the incorporation of demographics, aside from income and prices in leading empirical requisitions.

where; $\Omega_i = \frac{p_i q_i}{x}$ represents the good “ i ” budget share in the leftover budget surplus of spending on tobacco, “ $p_t q_t$ ” represents tobacco spending, while “ M ” denotes the total spending lacking the outlay on tobacco. “ $\sum f$ ” denotes the demographics and socio-economic attributes of the households that comprises household size, gender of the head, age of the

head, education of the head, number of children, number of earners, standard of living index (ref: No access to any facility e.g. occupation, electricity, gas, drinking water, drainage), durable assets index, and log of food expenditures.

4. Results and Discussion

This chapter discusses the empirical results based on the models that were presented in chapter 4. The results of the QUAIDS model show a negative relationship between household tobacco expense and share of education and health in the total budget of a household that can be verified from table.4.1, 4.2 and table.4.3 respectively. The null hypothesis in this study is that, the factors related along with the dichotomous variable “d” in equation.4.7 are mutually not significant i.e. $H_0: \alpha_{2i} = \beta_{2i} = \gamma_{2i} = 0$. The joint significance of the separability test is mentioned at the end of each table. It became apparent that consumer separability is rejected in Pakistan, both rural and urban region respectively. It shows the diverse preferences of tobacco users and non-users as both act differently.

The findings show that tobacco expense has a significant impact in crowding out other expenditures mainly education and health. This negative relationship provides us a very useful and visible picture that if an increase occurs in the household tobacco expenditure, falls in the budget allocated to education and health will be administer. The results are quite similar with the descriptive analysis carried out in the earlier chapter of the paper.

Thesis do not try to categorize the commodities in to necessities and luxuries here except education and health, but based on the results, however, when we applied quadratic parameter with the share of education the results confirmed the existence of an Engel curve formulation. Similarly, the application of QUAIDS model provides us a robust description of the household behavior representing crowding out.

4.1 Assessing Crowding Out Effect on Education

The results on the crowding out effects of tobacco on share of education in a household budget presented in Table 4.1. According to the standard demographic separability hypothesis, budget share on education is not detachable from the intake of tobacco. The expenditures on education has shown both income and substitution effect in table.4.1. As our prime concern is to find out the effect (crowding out) of tobacco outlay on household budget along with those socio demographic factors that are inclined by the conditional demand.

In order to achieve this concern, we have incorporated household tobacco expenses, logarithm of tobacco expenses (net of tobacco), region, household size, age and education of household head, durable assets, logarithm of food expenditures, the logarithm of total

household expenditure squared (to consider relationships that are not linear between total expenditure and portion of budget to other things by Engel Curve). The selection of these variables is based on economic theory provided by studies like Paraje (2017), which shows a negative (positive) coefficient associated with a lower (higher) budget portion of a household that consumes tobacco. These variables are broadly used in the articles alike as a regulator (control variable) for socioeconomic differences. The results present the outcomes on share of education (dependent variable) followed by a series of relevant independent variables effecting the share of education in the total budget of a household. The nature and results of all these independent variables is also discussed in detail. The dichotomous variable “d” (dummy of tobacco user shows if a household consuming any type of tobacco the value is “1” else “0”,) has an absolutely significant (positive) impact at 1% level of significance at country level and 5% level of significance at rural and urban region respectively, thus inclusion of this variable indicates household’s tobacco expenditure status.

In table 4.1, the tobacco expense shows a negative and significant impact at 10% level of significance that shows a rise in tobacco expenditure leads to a fall in the share of education ultimately support the theoretical framework of thesis. The negative sign associated with the Square of Log of Expenses confirms the formation of Engel Curve.

The role of durable assets in the demand for tobacco is blurred. The finding of this paper shows that the household with durable assets and high income have more ability to purchase finest forms of tobacco but due to their financial status it does not influence the share of education. While on the flip, we have a lot of poor people in the country who forgo the necessary expenditures like education and health due to tobacco consumption. The result shows negative association of this variable at 1% level, i.e. it leads to a reduced share of education in the total budget of a household due to tobacco expenditures.

Table 4.1: Crowding Out of Tobacco Usage on Education Share

Independent Variables	All	Rural	Urban
Dummy Tobacco User	0.049* (0.016)	0.062** (0.037)	0.061** (0.023)
Household Tobacco Expenses	-1.55E-07*** (9.59E-08)	-1.12E-07 (1.69E-07)	-1.87E-07*** (1.16E-07)
Log of Expenses (Net of Tobacco Expenditures)	0.020* (0.001)	0.015* (0.004)	0.025* (0.002)

Square of Log of Expenses (Net of Tobacco Expenditures)	-0.0007* (6.77E-05)	-0.0005* (0.00019)	-0.0009* (9.56E-05)
Dummy Tobacco User * Log of Expenses	-0.007* (0.002)	-0.009 (0.005)	-0.008** (0.003)
Dummy Tobacco User*Square of Log of Expense	0.0002* (9.63E-05)	0.0003 (0.0002)	0.0003** (0.0001)
Household Size	0.0001* (1.78E-05)	2.33E-05 (3.44E-05)	0.0001* (2.22E-05)
Age of HH head	-3.2E-05* (3.61E-06)	-3E-05* (6.41E-06)	-3.2E-05* (4.32E-06)
Education of HH head	8.41E-05* (1.21E-05)	0.00015* (2.58E-05)	6.86E-05* (1.35E-05)
Durable Assets	-1.97E-09* (7.42E-10)	-1.07E-08* (2.09E-09)	-1.27E-09** (6.27E-10)
Log of Food Expenditures	0.001* (0.0002)	0.001* (0.0003)	0.002* (0.0003)
Constant	-0.156* (0.011)	-0.126* (0.029)	-0.196* (0.017)
Number of observations	24238	8083	16155
F-Test	28.05	8.86	20.36
Joint Significance-Consumer Separability Test	0.000	0.000	0.000

4.2 Assessing Crowding Out Effect on Health

Similarly, table 4.2 and 4.3 discussed the impact of household tobacco expenditure on health share along with other control variables, using Engel curve and without Engel curve respectively. The expenditures on health has shown both income and substitution effect. The other factors that served as control variables are logarithm of expenses (net of tobacco), region, gender, standard of living, age of household head, number of children and number of earners in a household are used. The nature and results of each variable is discussed in detail as under.

The categorical variable “d” (dummy of tobacco user) as discussed earlier in this chapter, as expected, negatively associated with share of health. This shows that if the spending on tobacco increases it will lead a decline in share of health in total budget of a household. The

results mentioned below present the outcomes of share of health (dependent variable) followed by a series of relevant independent variables effecting the share of health in the total budget of a household. As our primary concern is to find out the effect of those socio demographic factors that are inclined by the conditional demand. In order to achieve this concern, we have incorporated age of household head, region, gender, standard of living, number of children and number of earners. The insertion of these variables provide us with negative (positive) coefficient and associated with a lower (higher) budget slice of a household consumes tobacco. These variables are broadly used and discussed in the literature as a regulator for socioeconomic differences.

Table 4.2: Crowding Out of Tobacco Usage on Health Share Using Non-Linear Model

Independent Variables	All	Rural	Urban
Dummy Tobacco User	-0.032 (0.058)	0.169 (0.133)	-0.074 (0.073)
Household Tobacco Expenses	-3.74E-07**** (2.86E-07)	-2.27E-07 (5.83E-07)	-4.96E-07*** (3.11E-07)
Log of Expenses (Net of Tobacco Expenditures)	0.007 (0.005)	0.0186 (0.014)	0.011** (0.006)
Square of Log of Expenses (Net of Tobacco Expenditures)	-0.0003** (0.0002)	-0.0007 (0.0005)	-0.0005** (0.0002)
Dummy Tobacco User * Log of Expenses	0.003 (0.008)	-0.028 (0.020)	0.009 (0.010)
Dummy Tobacco User*Square of Log of Expense	-4.6E-05 (0.0003)	0.001 (0.0008)	-0.0003 (0.0004)
Gender	0.003* (0.0008)	0.004* (0.001)	0.001 (0.001)
Age of HH head	0.000089* (1.08E-05)	3.14E-05 (0.000021)	9.88E-05* (1.21E-05)
Standard of Living (O)	-0.002** (0.001)	-0.002 (0.001)	-0.004** (0.001)
Standard of Living (OE)	-0.006* (0.001)	-0.005* (0.001)	-0.007* (0.001)
Standard of Living (OEG)	-0.011* (0.001)	-0.008* (0.001)	-0.010* (0.001)
Standard of Living (OEGD)	-0.015* (0.001)	-0.016* (0.002)	-0.013* (0.001)
Standard of Living (OEGDD)	-0.015* (0.001)	-0.022* (0.005)	-0.013* (0.002)
Number of Children (HH)	-0.0001* (7.25E-05)	-0.0006* (0.0001)	-0.0001** (8.13E-05)
Number of Earners (HH)	0.0003* (0.0001)	0.0005** (0.0002)	0.0005* (0.0001)
Constant	-0.004* (0.037)	-0.084 (0.091435)	-0.03976 (0.044493)
Number of observations	24238	8083	16155
F-Test	7.66	3.34	3.60
Joint Significance-Consumer Separability Test	0.000	0.000	0.000

Table 4.3: Crowding Out of Tobacco Usage on Health Share Using Linear Model

Independent Variables	All	Rural	Urban
Dummy Tobacco User	-0.02* (0.005)	-0.03* (0.01)	-0.01* (0.006)
Household Tobacco Expenses	-3.77E-07**** (2.85E-07)	-1.81E-07 (5.83E-07)	-5.13E-07** (3.11E-07)
Log of Expenses (Net of Tobacco Expenditures)	0.007** (0.004)	0.004 (0.01)	0.014* (0.005)
Square of Log of Expenses (Net of Tobacco Expenditures)	-0.0003** (0.0001)	-0.0001 (0.0004)	-0.0006* (0.0001)
Dummy Tobacco User * Log of Expenses	0.001* (0.0004)	0.002* (0.0008)	0.001* (0.0004)
Gender	0.003* (0.0008)	0.004* (0.001)	0.001 (0.001)
Age of HH head	0.00008* (1.08E-05)	3.06E-05 (0.000021)	9.87E-05* (1.21E-05)
Standard of Living (O)	-0.002** (0.001)	-0.002 (0.001)	-0.004** (0.001)
Standard of Living (OE)	-0.006* (0.001)	-0.005* (0.001)	-0.007* (0.001)
Standard of Living (OEG)	-0.011* (0.001)	-0.008* (0.001)	-0.01* (0.001)
Standard of Living (OEGD)	-0.01* (0.001)	-0.01* (0.002)	-0.01* (0.001)
Standard of Living (OEGDD)	-0.01* (0.001)	-0.02* (0.005)	-0.01* (0.002)
Number of Children (HH)	-0.0001* (7.25E-05)	-0.0006* (0.0001)	-0.0001** (8.13E-05)
Number of Earners (HH)	0.0003** (0.0001)	0.0005** (0.0002)	0.0005* (0.0001)
Constant	-0.007 (0.029)	0.009 (0.067)	-0.06** (0.03)
Number of observations	24238	8083	16155
F-Test	11.49	3.87	5.09
Joint Significance-Consumer Separability Test	0.000	0.0209	0.0062

The results from this paper show that the tobacco expense has an absolute and significant (negative) impact at 20% level on share of health at Pakistan level while its impact is at 10% level in urban region. It is accompanied with a dummy variable “d” which holds the value “0” if non-user and “1” if user of tobacco in any form. While few authors claims that coefficient (as projected here), computes crowding out of outlays and a differential budget share allocation [see John (2006) and (2012)].

This paper also incorporated the logarithm of total household expenditures (exclusive of tobacco expenditures) to measure the impact of total household expenses on the share of health and found a negative significant impact at 5% level on the health share in the total budget.

While constructing the variable Standard of Living, this study incorporated the access of household on five major necessary facilities (occupation, electricity, gas, drinking water, drainage) that may have some influence on tobacco consumption. The statistical results show a negative significant impact ranging from -0.30% to -1.30% in the above mentioned facilities at 5% level of significance collectively. Many authors like (John, 2011, Chelwa, 2014, Do YK et.al, 2015) discussed the same in diverse protocols like low-income or living conditions etc.

The independent variable number of children in a household has shown a negative significant impact at 1% level on the health share of a household. Based on findings, the higher the number of children the higher the tobacco expenses of a household. As discussed earlier that a larger part of the whole population living in rural areas with low income and a high illiteracy left them with a mindset that children empowered them financially.

The results found out was just alike John (2006) that a rise in the tobacco expenditure bring a reduction in the budget quota dedicated to health and education. It has been pre-assumed that the tobacco using household must have different preferences over non-tobacco users. This fact cannot be denied that there is an opportunity cost of tobacco expense in the form of letting far away many essential expenditures on other goods.

5. Conclusion and Policy Recommendations

An integral objective of this paper is to examine the distribution of budgetary resources among tobacco consuming households as compared to non-users of tobacco and related goods. Rather more consideration was paid to the socio-demographic factors responsible to consume or not to consume tobacco by households. There are several influential factors like age, gender and education of a household head, standard of living, number of children and

earners, availability of durable assets and food expenditures. While estimating the influence on share of education and health, all these factors were found with a significant impact (positive or negative) for a household consuming tobacco and related goods.

5.1 Conclusions

The estimates achieved by employing share of education and health in total budget as dependent variable while tobacco expenditures act as an independent variable along with a set of some demographic characteristics of a household as control variables to get appropriate results. We have used OLS estimation to evaluate our results. The estimation will be certainly helpful in the long run forecasting of the influence on household demand of education and health particularly due to consumption of tobacco and related goods, but also in evaluation of prosperity intensities across diverse households.

Assuming a practical form for demand models is a common practice. The assessments obtained from the QUAIDS model shows a negative relationship between tobacco expenditures and share of education and health in a household budget. While evaluating the results it has also been found that the household with a positive tobacco expenditures tend to divert the valuable monetary resource from most of the essential expenditures of a family that could be beneficial for them in some other way.

Around 61% of the total population of Pakistan is living in rural areas where poverty, unemployment, and illiteracy are the common factor for all masses. They are living below averages standard of living with least concerns for education and health. Illiteracy is the root cause of unawareness about education and health consciousness. People living in rural areas of Pakistan traditionally consume tobacco in different forms like huqqah is frequently use in Punjab province; naswar in KPK, guthka in Balochistan; pan, supari and other chewable forms of tobacco in Sindh respectively as observed by Bile et.al (2010). The most common and regular form of tobacco, used in all provinces is cigarette which has been became a practice among the respondents age 35 and above.

Although, household outlay on tobacco constitutes a low percentage impact while assessing its crowding-out effect on share of education and health in total budget it certainly reduces the amount of disposable family income. The habitual tobacco user has a pre-allocated slot of outlay for tobacco and use to spend the left amount on other necessary expenditures. Consequently, tobacco becomes not only costly but an addiction too, sendoff the household using tobacco with lesser earnings for further necessary things. In this perspective, we try to illuminate the essence of crowding out of education and health mainly that arises in household outlay arrangements as an outcome of tobacco disbursements.

Pakistan is an under-developed country facing a huge burden of internal and external debts. Being an agrarian country with low level of industrialization brings about a poor standard of living among the masses due to unemployment and inflationary pressure. The disposable incomes for a large part of population is low and spending on tobacco becomes inflated. While considering the opportunity cost of consuming tobacco the detriment of outlay on children's education, consuming unhealthy foods, and sacrifice on health expenses is obvious. Same pattern has found out by Becker (1965) where he observed a household as an alliance of more than one individuals performing as a sole entity of decision maker for consumption and the hypotheses that these entities perform for utility maximization facing constraint by scarce means is debatable.

The descriptive analysis of the PSLM 2015-2016 (Pakistan Social Living Standards Measurements survey), discovered numerous remarkable annotations. Our investigation proposes that poor and illiterate households using tobacco disbursed more of their finances on tobacco. We have included numerous socio-demographic variables like age, education, gender, region, standard of living, availability of durable assets, number of children and earners in a household to control the spending effects and prove our hypotheses. We have incorporated a method of Engel curves (conditional) to estimate the influence of tobacco expenditure on Education and Health among necessary goods and services.

5.2 Policy Recommendations

Based on the above research conducted following are some recommendations that should be adopted to lowering down the expenditures on tobacco:

- i. There must be a pronounced concern on stringent pricing policy on cigarette (tobacco) consumption which results in lower consumption of cigarettes (tobacco) for both higher and lower income groups respectively.
- ii. The tobacco control strategies should at least be fully implemented by pre-created laws and regulations at public areas.
- iii. Penalties should be imposed on usage and spitting of tobacco in different forms (cigarettes, bidi, tobacco raw, chew, pan, supari and naswar etc.) on public places.
- iv. Imposition of higher taxes on tobacco merchandising and extensive restrictions on smoking in civic places should be applied as demand reduction policies. Both the suggestive measures help in decreasing tobacco consumption and its subsequent destructions to societal health and economic development.
- v. There are a series of undertakings and rules that can restrain the consumption of tobacco in Pakistan. Some of the impressive precedents have been enforced in

Pakistan through the proclamation of Prohibition of Smoking Ordinance 2002 are Sales Restrictions to Minors, Clean Air Policies, and Tobacco Taxation and Policy like (TC) Tobacco Cess, (CED) Central Excise Duty, and (GST) General Sales Tax, adding about 78% of the trade amount. If appropriate enquiry on the practice of precedents and execution proceedings can be carried out, these laws can be operative.

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